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CRYSTALLOGRAPHY.—*The optical properties of some sugars.*[1] GEORGE T. KEENAN, Bureau of Chemistry. (Communicated by EDGAR T. WHERRY.)

The value of the optical properties for the identification of crystallized substances is now well recognized, and several systematic lists of properties in individual groups of compounds have been published. Thus far, however, there has been no comprehensive treatment of the commoner sugars. Some of the data here presented have been assembled from the crystallographic descriptions by Groth,[2] and some from the publication on the pentoses by Wherry.[3] Through the cooperation of the Carbohydrate Laboratory of the Bureau of Chemistry, many of the crystalline sugars were made available. The study of the optical properties of these sugars was carried out by the immersion method as applied by crystallographers.

Sugars are insoluble in the oily liquids commonly used in the immersion method. The liquids best suited for this study proved to be mixtures of mineral oil with $n = 1.49$ and monochloronaphthalene with $n = 1.64$ in such proportions that each liquid differed in n from the next by 0.005 or, in certain ranges, by a smaller amount. Their exact n values were determined on a refractometer; observations were made in yellow light, approximating that of the D-line, obtained by interposing a yellow glass or gelatine film between a source of white light and the microscope mirror.

The author desires to acknowledge the assistance of Mr. H. S. Paine and Dr. D. H. Brauns of the Carbohydrate Laboratory in furnishing the sugars for this study and of Dr. E. T. Wherry for suggestions in the preparation of the paper.

[1] Received Aug. 14, 1926.

[2] GROTH, P. Chem. Krystalog. **3**: 450. Also 435 and 448. 1910.

[3] WHERRY, EDGAR T. *Crystallography and optical properties of three aldopentoses.* Journ. Amer. Chem. Soc. **40**: 1852. 1918.

l-ARABINOSE

In ordinary light.—Crystals rod-like, with prominent oblique terminations, the rods being often collected in stellate groups or twins.

Refractive indices—(D). $n_\alpha = 1.551$, $n_\beta = 1.567$, $n_\gamma = 1.571$, $n_\gamma - n_\alpha = 0.020$, all ± 0.001; n_α is usually shown crosswise, and n_γ lengthwise.[3]

Characters shown in parallel polarized light with crossed nicols.—Extinction apparently inclined, but angle small; double refraction rather strong, (0.020), the colors being mostly first order; elongation negative.

Characters shown in convergent polarized light with crossed nicols.—Only traces of negative biaxial figures with large axial angle (90°?) obtainable.

Distinctive characters.—The minimum and maximum refractive indices ($n_\alpha = 1.551$, $n_\gamma = 1.571$) are both of value in identifying the substance.

FRUCTOSE

In ordinary light.—Consists of thin rods.

Refractive indices. (D).—$n_\alpha = 1.558$, n_β = indet., $n_\gamma = 1.561$, both ± 0.003; n_α occurs lengthwise and n_γ crosswise; both easily found.

Characters shown in parallel polarized light with crossed nicols.—Double refraction very weak (0.003), mostly first order colors being shown; extinction parallel; elongation negative.

Characters shown in convergent polarized light with crossed nicols.—None.

Distinctive characters.—The minimum and maximum refractive index values ($n_\alpha = 1.558$, $n_\gamma = 1.561$) are both readily found and significant for the substance. The weak double refraction differentiates this from all the other sugars studied.

d-GLUCOSE HYDRATE

In ordinary light.—Consists of six-sided plates.

Refractive indices. (D).—$n_\alpha = 1.521$, n_β = indet., $n_\gamma = 1.549$, both ± 0.002.

Characters shown in parallel polarized light with crossed nicols.—Double refraction moderate, $n_\varphi - n_\alpha = 0.018$; colors 1st or 2nd order.

Characters shown in convergent polarized light with crossed nicols.—The plates all extinguish sharply, indicating that β is more or less perpendicular to their broad face so that interference figures could not be expected; extinction parallel; elongation negative.

Distinctive characters.—n_α = 1.521 and n_γ = 1.549 both occur frequently enough to be of value for determinative purposes.

α-LACTOSE HYDRATE

In ordinary light.—The α-form or commonly recognized lactose hydrate is seen to consist of characteristic tomahawk-shaped crystals.

Refractive indices. (D).—n_α = 1.517, n_β = 1.542, n_γ = 1.550, all ±0.005.[4]

Characters shown in parallel polarized light with crossed nicols.—Second and third order colors evident; double refraction fairly strong (0.033); Bx∧ c = 10°, ∧ a = 99°.

Characters shown in convergent polarized light with crossed nicols.—Optic sign −; 2E = 33½°; figures rare.

Distinctive characters.—The characteristic shape of the crystals and the minimum and maximum indices of refraction are useful in identifying the substance.

LYXOSE

In ordinary light.—The material consists of six-sided grains, but little elongated in any direction.

Refractive indices. (D).—n_α = 1.532, n_β = 1.541, n_γ = 1.549, $n_\gamma - n_\alpha$ = 0.017, all ±0.001; n_α usually shown in one direction, and n_γ in the other.[2]

Characters shown in parallel polarized light with crossed nicols.—Extinction inclined, the angle, being, however, very small; double refraction moderate (0.017), colors being mostly first or second order.

Characters shown in convergent polarized light with crossed nicols.—Interference figures rarely seen, but occasionally part of a negative figure with very large axial angle is obtained.

Distinctive characters.—The maximum refractive index value, n_γ = 1.549, is readily found and is diagnostic for the substance, although the other value, n_α = 1.532, may also be used.

d-MANNOSE

In ordinary light.—The material consists of small, six-sided plates and rods.

Refractive indices. (D).—n_α = 1.529 crosswise; n_β = 1.536, lengthwise; n_γ = 1.563 crosswise; all ±0.002.

[4] WHERRY, EDGAR T. Journ. Agric. Research 21: 793. 1921.

Characters shown in parallel polarized light with crossed nicols.—Double refraction fairly strong (0.034); extinction varying from parallel to inclined; elongation ±.

Characters shown in convergent polarized light with crossed nicols.—Partial interference figures occasionally shown with plates inclined to an optic axis.

Distinctive characters.—The most significant refractive index value for this substance is $n_\beta = 1.536$ which occurs frequently lengthwise on six-sided rods.

d-MELIBIOSE

In ordinary light.—Habit rod-like, quadrilateral forms also being common.

Refractive indices. (D).—$n_\alpha = 1.526$ shown lengthwise; $n_\beta = 1.541$ shown crosswise; $n_\gamma = 1.560$ common, and occurring lengthwise; all ±0.002.

Characters shown in parallel polarized light with crossed nicols.—Polarization colors brilliant, 2–3 order; double refraction fairly strong (0.034); extinction parallel; elongation positive.

Characters shown in convergent polarized light with crossed nicols.—Biaxial interference figures rare; 2E appears to be large.

Distinctive characters.—The most characteristic optical constant for determinative purposes is the value of the maximum index, $n_\gamma = 1.560$ which occurs frequently on elongated forms lengthwise.

RAFFINOSE

In ordinary light.—The material consists of flaky rods and needles.

Refractive indices. (D).—$n_\alpha = 1.522$ lengthwise and common; n_β = indet.; $n_\gamma = 1.537$ crosswise; both ±0.002.

Characters shown in parallel polarized light with crossed nicols.—Double refraction moderate (0.015); extinction parallel; elongation negative.

Characters shown in convergent polarized light with crossed nicols.—None.

Distinctive characters.—The moderate double refraction and the refractive index shown lengthwise on rods and needles ($n_\alpha = 1.522$) are characteristic of this substance and should prove of value for determinative purposes.

RHAMNOSE MONOHYDRATE

In ordinary light.—The material consists of irregular fragments.

Refractive indices. (D).—$n_\alpha = 1.523$, $n_\beta = 1.531$, $n_\gamma = 1.534$.[2]

Characters shown in parallel polarized light with crossed nicols.—Double refraction moderate, (0.011).

Characters shown in convergent polarized light with crossed nicols.—Biaxial interference figures common, particularly grains perpendicular to an optic axis; optic sign $-$; $2E = 95°51'$.

Distinctive characters.—The frequency with which fragments show one optic axis up in the interference figure, also the minimum and maximum refractive index values ($n_\alpha = 1.523$ and $n_\gamma = 1.534$), are useful for determinative purposes.

d-RIBOSE

In ordinary light.—The material consists largely of rods and occasionally irregular fragments.

Refractive indices. (D).—$n_\alpha = 1.533$ shown lengthwise; $n_\beta = 1.549$ shown crosswise; $n_\gamma = 1.570$ shown crosswise; all ± 0.002.

Characters shown in parallel polarized light with crossed nicols.—Double refraction strong (0.037); extinction parallel; elongation negative.

Characters shown in convergent polarized light with crossed nicols.—No interference figures shown.

Distinctive characters.—The minimum refractive index value ($n_\alpha = 1.533$) and the maximum value ($n_\gamma = 1.570$) are both readily obtained, the former occurring lengthwise and the latter crosswise.

SUCROSE

In ordinary light.—The material consists of irregular fragments without any definite habit.

Refractive indices. (D).—$n_\alpha = 1.540$; $n_\beta = 1.567$, $n_\gamma = 1.572$.[2]

Characters shown in parallel polarized light with crossed nicols.—Double refraction fairly strong (0.032); second and third order colors shown.

Characters shown in convergent polarized light with crossed nicols.—Interference figures common, grains perpendicular to an optic axis being readily located; $2V = 48°0'$; ax. pl. b (010); $X \wedge c = 67°$ in obtuse angle β; optic sign $-$.

Distinctive characters.—$n_\beta = 1.567$ occurs very frequently and is considered significant for determinative purposes. The readiness with which interference figures are found is also characteristic of the substance.

TREHALOSE

In ordinary light.—The material occurs in the form of rods with oblique terminations.

Refractive indices. (D).—n_α = 1.528 shown crosswise and easily found; n_β = indet.; n_γ = 1.533 shown lengthwise; both ±0.002.

Characters shown in parallel polarized light with crossed nicols.—Colors gray; double refraction weak (0.005); extinction parallel; elongation positive.

Characters shown in convergent polarized light with crossed nicols.—No interference figures obtainable.

Distinctive characters.—The weak double refraction and the refractive index shown crosswise are characteristic of this substance and should be of value in determinative work.

d-XYLOSE

In ordinary light.—The material consists of irregular fragments.

Refractive indices. (D).—n_α = 1.517, n_β = 1.544, n_γ = 1.546, all ±0.001.[2] Fragments extinguishing in a hazy, indefinite manner (with crossed nicols) and showing (in convergent light) interference figures characteristic of grains perpendicular to acute bisectrix show n_β = 1.544 in one extinction position and n_γ = 1.546 in the other.

Characters shown in parallel polarized light with crossed nicols.—Polarization colors brilliant, two or three distinct marginal color bands showing on many of the fragments; double refraction fairly strong (0.029).

Characters shown in convergent polarized light with crossed nicols.—Biaxial interference figures common, many grains showing sections perpendicular to the acute bisectrix; 2E = 36° (approx.); optic sign −.

Distinctive characters.—The minimum and maximum refractive index values are readily found in this substance and can be used in identifying it optically.

DETERMINATIVE TABLE FOR THE SUGARS

Immerse crystalline material in the liquids of refractive indices shown in the left-hand column, made by mixing mineral oil and monochloronaphthalene. Examine under the microscope with polarizer in place and diaphragm partially closed, trying one liquid after another until the outlines of the fragments disappear when in one position in the field. Confirm identity of the material by the data in the central column, and obtain the name of the sugar in the right-hand column.

TABLE 1.—DESCRIPTION OF CRYSTALS AND CONFIRMATORY DATA

Index		*Sugar*
1.517	Tomahawk-shaped crystals are significant for this sugar. Confirm by immersion in liquid 1.550	α-Lactose hydrate
1.521	Material consists of six-sided plates, all extinguishing sharply, precluding interference figures. Confirm by immersing in liquid 1.549	d-Glucose hydrate
1.522	Material consists largely of rods and needles, this index being shown lengthwise. Confirm by immersing in liquid 1.537, which matches γ shown frequently crosswise	Raffinose
1.528	Rods with oblique terminations. This index is shown crosswise. Confirm by immersing in liquid 1.533, which matches γ shown frequently lengthwise on rods	Trehalose
1.534	Irregular fragments. Biaxial interference figures common. Confirm by immersing in liquid 1.523 which matches α	Rhamnose hydrate
1.536	Six-sided plates and rods. Confirm by immersing in liquid 1.563, which matches γ, shown frequently crosswise on rods	d-Mannose
1.546	Irregular fragments. Confirm by immersing in liquid 1.544, which matches β, shown frequently on fragments extinguishing in a hazy, indefinite manner	d-Xylose
1.549	Six-sided grains but little elongated in any direction. Confirm by immersing in liquid 1.532, which matches γ, and shown frequently	Lyxose
1.558	Thin, colorless rods; this index occurs lengthwise. Confirm by immersing in liquid 1.561, which matches γ, shown frequently crosswise on rods	Fructose
1.560	Rod-like and some quadrilateral forms; this index occurs lengthwise on rods. Confirm by immersing in liquid 1.541, which matches β shown frequently on rods crosswise	d-Melibiose
1.567	Irregular fragments; ease with which interference figures are found significant for this sugar. Confirm by immersing in liquid 1.572, which matches γ	Sucrose
1.570	Consists largely of rods; this index is shown crosswise on rods. Confirm by immersing in liquid 1.533, which matches α, and is shown frequently on rods lengthwise	d-Ribose
1.571	Rod-like, with prominent oblique terminations; this index occurs lengthwise on rods. Confirm by immersing in liquid 1.551, which matches α, shown frequently crosswise on rods	l-Arabinose

TABLE 2.—Optical Characters of Sugars Described

	l-arabinose	fructose	d-glucose hydrate	α-lactose hydrate	lyxose	d-mannose	d-melibiose	raffinose	rhamnose hydrate	d-ribose	sucrose	trehalose	d-xylose
Habit	rods	rods	plates	darts	grains	plates	rods	rods	plates	rods	plates	prisms	plates
Indices:													
n_α	1.551	1.558	1.521	1.517	1.532	1.529	1.526	1.522	1.523	1.533	1.540	1.528	1.517
n_β	1.567	indet.	indet.	1.542	1.541	1.536	1.541	indet.	1.531	1.549	1.567	indet.	1.544
n_γ	1.571	1.561	1.549	1.550	1.549	1.563	1.560	1.537	1.534	1.570	1.572	1.533	1.546
$n_\gamma - n_\alpha$	0.037	0.003	0.018	0.033	0.017	0.034	0.034	0.015	0.011	0.037	0.032	0.005	0.029
Distinctive	1.571	1.561	1.521	1.550	1.532	1.529	1.526	1.522	1.534	1.570	1.567	1.528	1.546
Colors	1	low 1	1–2	2–3	1–2	2–3	2–3	1–2	1–2	2–3	2–3	1	2–3
Extinction	st.	st.	st.	incl.	incl.	st. in.	st.	st.	indet.	st.	indet.	st.	indet.
Elongation	–	–	–	±	indet.	±	+	–	indet.	–	indet.	+	indet.
Figures	0	0	0	rare	rare	rare	rare	0	freq.	freq.	freq.	0	freq.
2E	indet.	90°	indet.	33½°	indet.	indet.	large	indet.	95°51′	indet.	79°7′	indet.	36°
Sign	indet.	90°	indet.	–	indet.	indet.	indet.	indet.	–	indet.	–	indet.	–

ZOOLOGY.—*Mammals of the vicinity of Washington.*[1] VERNON BAILEY, Biological Survey, U. S. Department of Agriculture.

Two hundred years ago the country now occupied by Washington and the District of Columbia was real wilderness, teeming with game animals, large and small. There were buffaloes, elk, deer, bears, panthers, wolves, beavers, and martens, which have since disappeared before the advance of civilization, but most of the smaller quadrupeds of that day are still to be found here in more or less reduced abundance. Some species, however, are probably just as numerous, and others may be more so than in the days of the Indian and the buffalo.

Unlike the birds most of the mammals are rather plain in appearance or highly protective in their colors and not easily seen when they sit still, and further to escape our notice they move about mostly at night in search of food or in carrying on their family affairs, and then sleep hidden away in their nests during the daylight hours. For these reasons the study of mammals is not so easy and generally attractive to beginners as that of birds, insects, or plants, but the very difficulty of finding their haunts and learning their habits renders the study especially fascinating to those who know how to go about it. One of the chief interests lies in our surprises as we discover in the small timid creatures intelligence and feelings akin to our own, for we too are mammals with well-developed brains, minds, and psychic senses, generally a little ahead of the rest of our class.

Here in the District of Columbia we have an excellent opportunity for the study of our native animals, although the rabbits, woodchucks, squirrels, and chipmunks are the only diurnal species. Many of the others can be watched during the evening or morning twilight hours, and still others may be caught in cage traps or bottle traps and kept in captivity long enough for careful study of their habits, intelligence, and dispositions. If given good care and quarters with comfortable, sanitary, and attractive cages, most of the small animals enjoy their captivity and some will become sufficiently gentle to be natural and easily handled. Others may be watched and partially tamed while entirely free in their native haunts.

The gray squirrels in our parks and yards readily respond to human attentions and kindness. Quick in reaction to a threat from man or dog or cat and in taking refuge in treetops, they are just as quick to recognize a friendly look or gesture and in coming boldly up to receive

[1] Radio talk, May 22, 1926, under the auspices of the National Zoological Park, arranged by Austin H. Clark. Received Aug. 4, 1926.

food from the extended hand. But we are not always consistent in our treatment of our squirrel friends, for at times we feed them lavishly and again, when they especially need food and water, we forget about them and leave them to suffer or hunt for new homes. They need water every day and suffer oftener with thirst than with hunger. We could also add greatly to their comfort by occasionally puffing flea powder and sulphur into their nests to kill the parasites that torment them. At times these are so troublesome that the squirrels are forced to leave home and build fresh nests of leaves in the branches of the treetops.

The big yellow fox squirrels and the bright little red squirrels may be found in the neighboring woods, but have not yet gained enough confidence in man to visit our yards and parks.

The little striped chipmunks are occasionally seen on the edge of the woods or in Rock Creek Park, scampering for the nearest holes in the ground or to hollow stumps or logs, where they can feel safe. They have good reason to be timid and nervous, for stray cats leave few of them to be seen by anyone. Nevertheless they usually respond to soft words and proffered food. Rolled oats and nuts are the most enticing bait with which to win their confidence, and with skill and patience you can soon have them eating out of your hand. In this climate they are generally out on warm days all winter but in the North they are one of the seven sleepers who spend the winter in deep hibernation.

The big fat woodchucks, or groundhogs, also of the squirrel family, are another of the seven sleepers and may be found up the Potomac half way to Great Falls. Often they are seen sitting on the rocks sunning themselves on summer mornings, or out in clover fields in autumn, getting fat as fast as they can for their long winter sleep. In the North they generally remain curled up in their underground nests from October to April, but in the mild climate of Washington they often wake up during a warm wave and not infrequently may see their own shadows on the fateful Groundhog Day of February second. Whether they see their shadows or not they generally go back and sleep through several weeks more of cold winter weather. As a matter of fact they usually sleep most of the time until the green grass and clover come up in spring to supply their food and take the place of last year's accumulation of fat, which has carried them through the winter. Because they eat his clover the farmer generally considers them his enemies and makes war upon them with dogs, guns, and traps, so they are among the most shy and timid of our wild animals, but they are often tamed and make interesting pets.

The little flying squirrels with soft coats of fur, big eyes, spreading tails, and folded winglike membranes along the sides of the body are beautiful and gentle little animals, but so owl-like in their nocturnal habits that they are rarely seen alive. They sleep all day in some hollow tree, old woodpecker hole, or a soft bark nest in the top branches of a juniper tree, and if one knows how and where to look for them, they are sometimes found in the very edges of Washington. If you pound on the tree with a stone or an ax you may see a little gray nose and beady eyes appear in the doorway above, and if you pound still harder you may see the wings unfold and carry the little animal, gliding rapidly on the air, to some other tree 20 to 50 feet distant. It is not real flying, however graceful and wonderful it may seem, for the animal always alights lower down than where it started, and only by running up each tree trunk and soaring to another point lower down can it progress rapidly through the forest. Flying squirrels are easily tamed and make interesting and lovable pets if you have the right kind of place for them. At large, in the house, they are apt to do some mischief by making their nests in curtains, cutting up papers and clothing for nest material, or knocking things off the shelves and bookcases.

Cottontail rabbits are often seen in the District of Columbia, where they are protected from hunting, and they would be much more common if it were not for stray cats and dogs that catch many of them before they grow up. If given a reasonable degree of protection they soon multiply and become common up to the edges of the city, in the parks, and even in our dooryards. In many states cottontails are considered the most valuable game animal because they are so abundant that they afford hunting for more people than all the other game. For my part I would rather see them around than shoot them, though when they get too numerous, I see no harm in rabbit pies. Too many rabbits might destroy all our bushes and young trees.

Speaking of destructive animals, the brown rat, or wharf rat, is the most destructive and offensive animal we have, not only in the city and in any houses or buildings where they can gain an entrance, but also out in the fields wherever there is grain or food to their liking. They are not only filthy and destructive but dangerous as well, for they carry disease and have been among the chief distributors of bubonic plague. With modern methods of destroying rats and keeping them from obtaining food they are now less destructive and dangerous than at any time since they were brought to this country from Europe in the early colonial days.

We have also a native animal called a wood rat, or pack rat, very different from the Old World rats, a large-eared, soft-furred, bright and pretty little inhabitant of the woods and rocky cliffs. A few may be found along the rocky banks of the Potomac near Great Falls, but they are so scarce, so shy and so strictly nocturnal that they are rarely seen unless captured for study or for specimens.

Our fur-bearing animals are represented by a few red and gray foxes, raccoons, opossums, otters, minks, weasels, skunks, and muskrats, all rather scarce and rarely seen except by trappers.

The mere mention of mice will no doubt cause a shudder, just because everybody knows the disagreeable, smelly pest of our pantries and cellars—the house mouse, which was also introduced from the Old World.

But we have many small native animals of mouse size in our fields, meadows, and forests without any of the disagreeable traits of the house mice, and each of the half dozen different kinds is as interesting in its habits and means of making a living as any of our larger animals. Some of the small animals are useful to man, while some are of no economic importance; others can do great damage to our crops and fruit trees if we do not watch out. The meadow mice and pine mice, or apple mice, are the most dangerous species, often destroying crops and killing fruit trees on a large scale, but they are not difficult to control. The little harvest mice and the deer mice are bright and pretty and practically harmless, while the long-tailed jumping mice are entirely harmless and especially interesting in their habits. Like the woodchucks they have solved the fuel problem by going to sleep in warm nests underground when the nights get cold in October, and waking up when the flowers begin to bloom in the spring, some five months later. We are still ignorant as to whether the time they spend in sleep is deducted from their allotted span of life, or whether added to it, and I am keeping several of them in comfortable captivity to determine this point before recommending hibernation to any of my friends.

Another group of small animals, including the insect eaters, the moles and shrews, is well represented here. The common mole is plentiful and the star-nosed mole is rare, but both are animals highly useful to man and very interesting from their burrowing habits and their ravenous appetites. They feed almost entirely on earthworms, cutworms, and other small insect and animal life found under the surface of the ground.

The shrews of about four different species have much the same food

habits as the moles, but being smaller take other sets of insects and smaller animal life. They vary in size from the velvety, short-tailed shrew, about the size of a mouse, down to the tiny least shrew, the smallest mammal in America, if not in the world. Each species, however, fills its place in the animal economy of our country, and in preserving a wholesome balance of nature.

Bats are well represented about Washington by at least ten species, and of about half of these there is an abundance of individuals. They range from the great hoary bat, the large brown bat, the silvery-haired and red bats down to the little brown bat, the least brown bat, and the little pipistrelle. Anyone can see them flitting about the houses and trees in town or out in the woods on warm evenings in summer, and usually can recognize some of them by different sizes and colors before the twilight is too far advanced. To many the mention of bats brings up pictures of darkness and mystery, and vermin and hooked claws entangled in ladies' hair, and a general feeling of terror and disgust, all products of ignorance and imagination. Our bats are really highly specialized and intelligent mammals. They are clean in habits and usually free from parasites and have never been known to get in anyone's hair or to bite or hurt anyone unless abused. If handled gently they soon become quite tame and make interesting house pets, learning to come for food and water at regular times and quickly ridding the house of moths and night-flying insects.

In many cases we find a practical advantage in knowing our friends and foes in the animal world, but in any case we understand ourselves better by knowing more of what we have been taught to call the lower animals.

ZOOLOGY.—*A new toad from China.*[1] LEONHARD STEJNEGER, United States National Museum.

Among the collections brought home by Mr. F. R. Wulsin, leader of the National Geographic Society's Expedition to Kokonor in 1923, there is a large series of an undescribed species of toad. It was collected during his stay from August 24 to 31 at Choni, on the Tao River, about 120 miles south of Lanchow, Kansu, China, consequently on the north slope of the Min range, which here forms the boundary between the provinces of Kansu and Szechwan. Rev. D. C. Graham, during his trip to Sungpan in 1924 obtained a number of specimens at the latter place, consequently on the south slope of the same range.

[1] Received Aug. 21, 1926.

Whether its habitat is restricted to this mountain system remains to be seen.

Bufo minshanicus, sp. nov.

Diagnosis.—Top of head without bony crests, except a faint one on canthus rostralis; first finger longer than second; toes webbed one half or more; subarticular tubercles double; tarsal fold more or less distinct; tympanum distinct, less than ½ diameter of eye; top of head with large rounded warts; upper side of tibia with large warts, more or less confluent; a large oblong gland on outer side of tarsus.

Type.—U. S. National Museum No. 68567.

Type-locality.—Choni, on Tao River, Kansu, China.

Total length of type, an adult female, 78 mm.

Remarks.—This species is easily recognized among Chinese toads by the large globular tubercles on top of the head, especially a semicircle of three or four large ones marking the inner edge of the upper eyelid. The canthal ridge is also generally covered with one or more large warts. On the upper side of tibia there is one or more conspicuously large glands.

ZOOLOGY.—*A new Pelobatid batrachian from Borneo.*[1] DORIS M. COCHRAN, United States National Museum. (Communicated by A. WETMORE.)

In the splendid collection of amphibians from Borneo sent to the United States National Museum by Dr. W. L. Abbott some years ago, there is a Pelobatid toad belonging to the genus *Megophrys*, which has not been described. I take great pleasure in naming it after the collector, whose untiring efforts have resulted in a vast enrichment of our scientific knowledge in nearly every branch of biology.

Megophrys abbotti, new species

Diagnosis.—Profile of snout obliquely truncate, strongly projecting beyond lower jaw; canthus rostralis angular and loreal region oblique; head one and one-fifth as broad as long; tympanum distinct; tibio-tarsal articulation not reaching beyond eye; tibia two and one-half times in length from snout to vent; toes with a slight rudiment of web; vomerine teeth none; tympanum half the diameter of the eye and greater than its distance from the eye; nostril much nearer end of snout than eye.

Type.—U. S. National Museum no. 39097, collected at Balik Papan Bay, Eastern Borneo, February 6, 1909, by Dr. W. L. Abbott.

Description.—Tongue nicked behind; head moderate, one and one-fifth times as broad as long; pupil vertical; snout obliquely truncate in profile, projecting beyond the lower jaw, longer than the eye; canthus rostralis very sharp; loreal region vertical, slightly concave; nostril situated at extreme end of canthus rostralis and much nearer to tip of snout than to eye; interorbital

[1] Published by permission of the Secretary of the Smithsonian Institution. Received Aug. 14, 1926.

space flat, one and one-half times as broad as the upper eyelid; tympanum very distinct, half the diameter of the eye, and greater than its distance from the eye; fingers with very feebly swollen tips, first and second equal, about two-thirds the length of the third; subarticular tubercles absent; two large carpal tubercles, the inner somewhat the more pronounced; a small and inconspicuous inner metatarsal tubercle; no outer metatarsal tubercle; toes slender, with feebly swollen tips, slightly webbed, the web fringing the first two toes nearly to their tips; a small dermal ridge beneath the fourth toe; tibio-tarsal articulation reaching the eye; tibia two-fifths the distance from snout to vent; foot shorter than tibia. Skin on top of head perfectly smooth, on back very minutely "shagreened," on eyelids and sides of head and body distinctly dotted with glandules, on lower surfaces perfectly smooth. A strong glandular ridge beginning at the nostrils and extending along the canthus rostralis, continuing again on the posterior corner of the eyelid, extending above the tympanum and beyond it almost to the shoulder; a flattened wart on each side of the breast behind the insertion of the fore limb; no warts on the chin.

Coloration yellowish brown above, with no markings excepting a dark patch beneath the canthus rostralis, a small dark spot on the posterior corner of the eyelid, and another on the tympanum; under surface yellowish white, the chin and throat tan. The type is unique.

Dimensions

	mm.		mm.
Snout to vent	54	Diameter of tympanum	4.5
Length of head to occiput	20	Distance between eye and tympanum	3
Width of head	25	Hand	14
Extreme tip of snout to eye	10	Tibia	22
Diameter of eye	9	Foot	19
Interorbital width	8		

From the five species of *Megophrys* already known from Borneo and listed in Dr. Van Kampen's excellent work on the Amphibia of the Indo-Australian Archipelago (1923), this species can be easily distinguished. It could never be confused with *M. montana*, which has a pointed eyelid, nor with *M. nasuta*, possessing a pointed snout. *Megophrys gracilis*, also of Borneo, is a very long-legged toad, unlike *M. abbotti; M. baluensis* has a head twice as broad as long, differing from the new species which has a head only one and one-fifth times as broad as long. From *M. hasselti*, the only remaining described species from Borneo, *M. abbotti* differs in possessing a very distinct tympanum, a sharply sloping and truncated snout, in having the nostrils situated at the extreme end of the upper surface of the snout, and in coloration.

In using the key contained in Boulenger's "Revision of the Oriental Pelobatid Batrachians (Genus *Megalophrys*)," the new species falls nearest to the Chinese *Megalophrys boettgeri*. But *M. boettgeri* has the tongue entire; the nostrils are equally distant from eye and from the end of the snout; the carpal tubercles are indistinct or absent; there are two warts on the chin; and finally, there are symmetrical blackish markings on the body. None of these characteristics are found in *M. abbotti*.

ENTOMOLOGY.—*New neotropical myrmecophiles.*[1] WILLIAM M. MANN, U. S. National Museum, Washington, D. C. (Communicated by S. A. ROHWER.)

Descriptions of the following new myrmecophilous beetles have been prepared for some time, and duplicate specimens of some of the

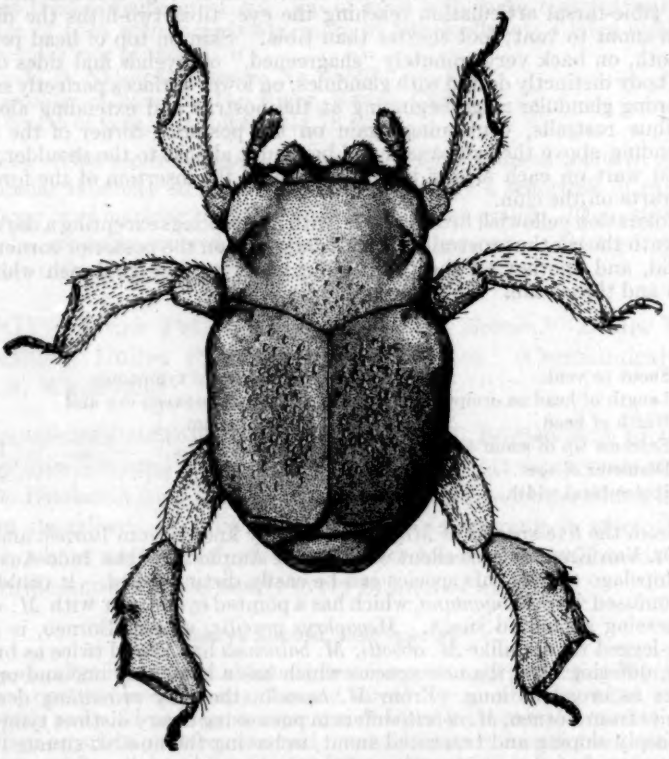

FIG. 1.—*Terapus mexicanus*

species have been sent to various correspondents. With the exception of the new species of *Terapus*, all of the myrmecophiles described in this paper are guests of various species of Army Ants.

Terapus mexicanus, new species

Length 2 mm.

Brownish red, shining. Head sparsely, coarsely and irregularly punctate, and with short and fine erect hairs, clypeus and labrum smooth, front rather

[1] Received Aug. 25, 1926.

strongly concave and at middle with an impressed line extending to base of labrum; sides in front of eyes thickly margined, the margins diagonal above and extending forward as very fine carinae bordering the median impressed line; clypeus transversely concave. Pronotum with sparse irregular punctures, coarsest along the basal border; transverse, broadest behind, anterior border broadly emarginate at middle; anterior corners rounded, posterior corners broadly angulate, sides bilobed, the anterior lobe the longest of the two and the inner surface of both impressed, bordering a nearly flat triangular area in the middle of which is a rounded tubercle bearing a thin brush of yellow trichomes; median surface evenly convex. Elytra longer than broad, humeri gibbous, basal margin with several short, shallow impressions; surface with abundant elongate punctures, coarser than on pronotum. Propygidium transversely hexagonal, divided at middle by a bi-arcuate line, the upper surface flat, the lower surface roundly elevated at sides and concave at middle; surface very sparsely punctate. Pygidium a little broader than long, sparsely and finely punctate. Keel of prosternum as broad in front as behind, sides very feebly arcuate, nearly parallel, obtusely margined, the margins rounding and converging in front becoming almost obsolete, at middle posterior border broadly emarginate, surface finely and densely punctate and distinctly concave; a feeble transverse impression at base of lobe, which is finely punctate and shining, and, at anterior border, entire. Mesometasternum without dividing line; anterior border and sides with a fine margin, the anterior border biconcave, narrowly arcuate at middle, sides nearly straight. Legs broad, anterior femora stout, dorsal edge straight, ventral concave, tibiae broadly triangular, the basal half of outer border arcuate, apical half nearly straight, with a few very small, widely separated spines; middle femora longer, tibiae elongate triangular, the basal edge feebly concave, longer than the apical, which is more concave and separated from it by an angle; posterior femora broad, rather compressed, with a strong, transverse truncated lobe at base of dorsal border, ventral border concave at middle, rounded at base, tibiae broad and flattened, lower border concave at middle, upper border with the basal portion nearly two times as long as the apical, projecting and rounded at middle, separated from the anterior edge by an angle.

Type locality.—Mexico, San Diego Cocula, Jalisco, Guadalajara.

Host.—*Pheidole kingi* Pergande.

Type and paratypes.—Cat. No. 29051 U. S. N. M.

Described from five specimens (one type) taken by the writer with host ant, which nests in populous colonies common on moist slopes.

The legs, the elytra, the sculpture and color are entirely different from the other species of *Terapus* to which I assign this species on account of the structure of the head and thorax. It has no close relationship with *T. mnriszechi.*

The pilosity is fine and very short above, equally fine but longer on the legs. There is a distinct though thin line of golden trichomes on the apical half of the upper edge of the basal part of the posterior tibiae.

Ecitophya rapaxae, new species

Length 6 mm.

Opaque, dark brown to black, apical half of gaster, ventral surface of thorax, the coxae and trochanters lighter. Moderately fine and very dense punctation on head, body and appendages; elytra also finely tuberculate. Hairs coarse, erect, mainly black, but some with brownish reflections.

Head a little longer than pronotum, broadest just posterior to eyes from where the sides converge to the straight posterior border which is less than one-half as broad as the front between the eyes; vertex convex; front behind eyes with longitudinal impression at middle. Clypeus very strongly carinate at middle for two-thirds its length, anterior margin nearly straight. Eyes convex. Basal antennal joint two times as thick and two-thirds as long as the third, second joint about as long as broad, third joint longer than the fourth and fifth together, joints 3 to 9 nearly three times as long as broad; penultimate joint as long as the terminal, which is obliquely connate at tip. Pronotum only slightly broader than head including eyes, broadest behind middle, anterior angles and border broadly rounded, sides, posterior to middle feebly concave and divergent, posterior angles narrowly rounded, hind margin broadly convex; disc at middle narrowly and strongly impressed longitudinally, the impression somewhat broadened anteriorly; sides broadly and shallowly concave. Elytra broader than pronotum and much longer than broad, humeri broadly and posterior angles narrowly rounded, sides nearly straight, posterior border emarginate. Abdomen but little broader than elytra and shorter than head and thorax together. Legs very long and slender, with the posterior basitarsi nearly as long as the remaining joints together.

Type locality.—Cachnela Esperanza, Rio Beni, Bolivia.

Type.—Cat. No. 29052 U. S. N. M.

Host.—*Eciton rapax* Smith.

A single specimen found by the writer in a file of the ants.

This species is closest to *Ecitophya simulans* Wasm., but distinct in the structure of the head, which is comparatively broad in front and strongly narrowed behind, its more convex eyes, more elongate elytra and coarser punctuation.

Ecitomorpha melanotica, new species

Length 3.75 mm.

Opaque black, appendages dark fuscous; evenly cribrate-punctate, more finely and shallowly on abdomen.

Hairs erect, black, long and finely tipped, moderately abundant, shorter and stiffer, semi-erect and more abundant on appendages.

Head more than twice as long as broad and a little broader behind than in front, sides feebly convex; front shallowly impressed at middle between eyes; vertical region feebly convex. Clypeus convex, anterior border broadly emarginate. Antennae long, thickened apically, the basal joint thick and convex at sides, shorter than joints 2 and 3 together, second joint a little more than half as long as the third and as long as the fourth, joints 4–10 gradually increasing in length and thickness and all distinctly longer than broad, the terminal one and one-third times as long as the penultimate and slightly narrower, slightly arcuate, narrowed and rounded apically. Pronotum a little shorter than in *E. arachnoides*, the median longitudinal impression strong, the lateral depressions very feeble. Elytra together a little broader than their length at suture, anterior and posterior corners broadly rounded, sides nearly straight, posterior border rather strongly emarginate at middle. Abdomen convex, elongate, as broad in front as behind, sides slightly arcuate.

Type locality.—Mixco, Guatemala.

Host.—*Eciton burchelli* var. *infumatum* Wheeler.

Type.—Cat. No. 29053 U. S. N. M.

Described from a unique specimen, collected by the writer as the result of an hour's watch of an army of the ants.

This is distinct from *Ecitomorpha arachnoides* Wasm. in having a shorter, broader head, more narrowly compressed between the eyes, and in its more slender antennal joints. The impressions on the sides of pronotum are more feeble than in *E. arachnoides*.

Mimeciton antennatus, new species

Length 2.10 mm.

Yellowish brown, abdomen darker; subopaque, finely rugulose-punctulate, more finely and shallowly on the abdomen, which is moderately shining. Pile and pubescence very fine and silky, yellow in color, moderately abundant on head, body and appendages.

Head from the front, quadrate, about one and two-thirds times as long as broad, sides and posterior border straight, cheeks swollen, front between the antennal foveae strongly elevated and subcarinate, triangular in front and continuous with clypeus, the surface of which is flattened and the anterior border truncate; outer border of antennal foveae strongly margined. Mandibles thick basally, sharply pointed at tips. Antennae long and rather stout, their scapes longer than the head, of nearly uniform thickness and slightly arcuate; second joint broad, somewhat compressed and curved, longer than joints 3–4–5 together; joint 3 transverse, joints 4 to 9 gradually increasing in length and thickness, those anterior a little longer than broad; terminal joint longer than the preceding two together, shallowly constricted in front of middle, rounded at tip. Pronotum about two times as long as broad, broadest and with sides rounded in front, impressed shallowly and transversely near middle. Elytra without indication of suture, longer than broad, posterior border deeply emarginate, with the sides extending as vertical, rather thick lamellae, projecting and obtuse at tips and entirely concealing from the side the short abdominal peduncle. Abdomen very convex, strongly incrassate behind, shortly and narrowly pedunculate in front. Legs long and slender; joints of posterior tarsi very long.

Type locality.—Tena, Ecuador.

Host.—*Eciton* (*Labidus*) *praedator* F. Smith.

Type and paratypes.—Cat. No. 29054 U. S. N. M.

Described from five specimens (one type) taken by F. X. Williams, Feb. 24, 1923, in marching files of the host ant.

This species differs from *Mimeciton pulex* Wasm. and *Mimeciton zikani* Wasm., both of which also live with *Eciton praedator*, in being more opaque, in its shorter and broader head with the front more elevated between the antennal insertions, and in the form of the second antennal joint. This is peculiar being narrow basally, clavate anteriorly and broader than the following joints, quite scapiform in itself, and as long as the following three joints together.

CEPHALOPLECTINAE

Cephaloplectus trilobitoides, new species

Length 1.75 mm.

Dark reddish brown, form broad, pubescence short, whitish, moderately abundant, pilosity long and fine, suberect, arranged in about ten longitudinal rows; abdomen rather thickly pilose, apical segment at base with several stiff, though slender, dark, needle-like hairs as long as the segment itself.

Head above about four times as broad as long. Pronotum transverse, a little longer than the elytra; posterior corners strongly projected and acute; posterior border straight at middle. Elytra transverse, little narrowed behind, sides moderately arcuate, posterior corners slightly projecting and rounded, border straight. Abdomen tapering, last segment quadrate, truncate apically. Labrum transverse, rounded at sides. Penultimate joint of maxillary palpi elongate, cylindrical. Mesosternum roundly and rather narrowly emarginate behind.

Type locality.—Esquintla, Guatemala.

Type.—Cat. No. 29055 U. S. N. M.

Host.—*Eciton coecum* Mayr.

Related to *Cephaloplectus quadriglume* Wasm., but smaller and proportionately broader and with the posterior corners and pronotum much longer and more acute. Described from a single specimen collected by the writer.

Cephaloplectus flavus, new species

Length 2.25–2.50 mm.

Pale yellow-brown throughout, feebly shining; head above, thorax and elytra rather densely covered with short and fine yellowish pubescence and with abundant, regular, long, stiff very finely tipped sloping hairs; abdomen and ventral surface of thorax with recumbent pilosity.

Labrum nearly twice as broad as long, sides arcuate, anterior border shallowly emarginate. Penultimate joint of maxillary palpi cylindrical, three times as long as broad. Mentum quadrate, transverse. Antennae flattened, basal joint short, club not sharply distinct from remainder of antennae, intermediate joints very strongly transverse. Pronotum distinctly longer than elytra, convex, sides arcuate, posterior corners angulately produced. Elytra transverse, posterior corners and border broadly arcuate. Abdomen strongly tapering, tip narrow and truncate. Prosternum shallowly concave between coxae and a little behind, then convex; posterior border strongly, arcuately emarginate.

Type locality.—Hamburg Farm, Santa Clara, Costa Rica.

Type and paratype.—Cat. No. 29056 U. S. N. M.

Host.—*Eciton.*

Differs from *Cephaloplectus quadriglume* Wasm. in its more slender form, smaller size and pale coloration. Described from two specimens collected by F. Nevermann, one selected as type.

Cephaloplectus mus, new species

Length of head, thorax and elytra 2.25 mm. (abdomen strongly contracted). Broadly oval, convex, moderately shining, coriaceous; rather heavily

pubescent and with abundant, slanting, acute, yellowish hairs; color dark brownish red.

Head above a little less than four times broader than long. Pronotum rather strongly convex above, broader than long and distinctly longer than the elytra, posterior corners projecting and subangulate. Scutellum large and triangular, less than two times as broad as long. Elytra at base as broad as pronotum, sides feebly arcuate, posterior corners very broadly rounded, posterior border straight. Ultimate abdominal segment narrowly rounded at middle. Labrum and mentum transverse. Prosternum broadly and shallowly impressed posterior to coxae, flat behind, posterior border deeply and rather narrowly excavated.

Type locality.—Mera Oriental, Ecuador.

Type and paratype.—Cat. No. 29057 U. S. N. M.

Host.—*Eciton vagans* Smith.

Described from two specimens (one type) taken Feb. 1923 by F. X. Williams in files of the host ant.

This is larger than *Cephaloplectus quadriglume*, the elytra are distinctly broader, the pubescence above much thicker, the scutellum is also proportionately large, in *C. quadriglume* very small.

Cephaloplectus pusillus, new species

Length 1.60 mm.

Pale yellow-brown, shining; pubescence very short and white, not dense; surface finely coriaceous, sparsely punctate, each puncture with a long and fine, nearly erect pale yellow hair.

Head above four times as broad as long; labrum and mentum transverse, flat. Pronotum transverse, distinctly longer than elytra, posterior corners projecting and acute. Elytra individually broader than long, posterior corners less broadly rounded than in *Cephaloplectus flavus*. Last abdominal segment truncate. Abdomen rather thickly pilose and with a few coarser, erect hairs, all golden yellow in color. Mesosternum rather broadly emarginate.

Type locality.—Hamburg Farm, Santa Clara Province, Costa Rica.

Type.—Cat. No. 29058 U. S. N. M.

Host.—*Eciton.*

This species resembles *Cephaloplectus flavus*, but has the posterior angles of the pronotum much more elongate and arcuate, the elytra are much broader (in *C. flavus* each is distinctly longer than broad), and the erect hairs on the dorsal surface are sparse but longer and more erect. Described from a single specimen collected March 3, 1925, by F. Nevermann.

Eulimulodes, new genus

In habitus and general structure resembling *Cephaloplectus* but differing in the maxillary palpi and antennae. The maxillary palpi have the first joint very small, the second about as long as the third, slender basally, triangularly clavate and somewhat compressed apically; the third joint is elongate oval and compressed, obliquely truncate at apex; the terminal joint is thickly subulate. The basal antennal joint is large and nearly as long as the remaining part of antennae excluding the club, the following joints are small and

submoniliform; the club is large and strongly compressed, composed of two broad segments, the apical slightly the longest. The remainder of head and the prosternum are very similar to these parts in *Cephaloplectus*.

Genotype.—*Eulimulodes mexicanus*, new species.

Eulimulodes mexicanus, new species

Length 2 mm.

Brownish red. Broadly oval, tapering behind, coriaceous, closely seriolately pilose, the pile short and appressed, pale yellow, almost white; surface moderately shining.

Portion of head visible from above three times as broad as long, its anterior border forming an even arc with the sides of pronotum; labrum slightly transverse, a little broader behind than in front, sides straight, anterior border shallowly emarginate and with an impressed space near margin. Penultimate joint of maxillary palpi broad, subovate and compressed, terminal joint subulate and about three-eighths as long as the penultimate. First antennal joint nearly as long as side of labrum, club oval, strongly flattened, the two joints subequal in length and very much broader than the moniliform joints between it and the basal. Pronotum a little broader than long, about as long as elytra, strongly convex, sides arcuate, posterior corners moderately produced and narrowly rounded, posterior border nearly straight. Scutellum very broadly triangular. Elytra at base a little narrower than pronotum, together broader than long, narrowed behind; posterior corners broadly rounded, border nearly straight. Abdomen moderately tapering, apical segment shallowly emarginate at tip; dorsal surface with abundant, recumbent, long and fine black hairs. Ventral surface shining, pilosity longer, finer and less appressed than on dorsal surface. Prosternum broadly convex except between coxae, where it is flatter, triangulately emarginate behind.

Type locality.—Ixthan, Nayarit, Mexico.

Type and paratype.—Cat. no. 29059 U. S. N. M.

Host.—*Eciton* (*Acamatus*) *wheeleri* Emery.

Described from two specimens (one type) taken with the host, out from beneath a stone, by the author.

Cephaloplectus godmani Sharp from Panama is a much larger species and the pronotum is proportionately longer. *Cephaloplectus quadriglumis* Wasm. which lives with *Eciton quadriglume* Hal. is similar in habitus but lighter in color and above with erect hairs, lacking in *Eulimulodes mexicanus*. The emargination of the posterior margin of prosternum is more broadly angulate and all of these have the third joint of the maxillary palpus long and slender and the antennal joints broad.

This species resembles an exceedingly large *Limulodes* and sufficient material for dissection may show a close relationship between the two.

Xenocephalus lucidus, new species

Length 3.5 mm.

Yellowish brown, minutely and sparsely punctate and shining, a few delicate striolae visible on front margin of head, without hairs above.

Form elongate, strongly convex above. Head from above four times as broad as long, arcuate in front and behind, with small, lumate portions of the eyes visible at sides. Pronotum transverse, at middle slightly shorter than

elytra, anterior border broadly emarginate, anterior corners rounded, sides arcuate, posterior corners slightly projecting and more narrowly rounded than the anterior ones; posterior border feebly arcuate. Elytra at base as broad as pronotum, transverse, sides, seen from directly above, nearly straight and parallel, very slightly projected and rounded at posterior corners, posterior border feebly sinuate. Abdomen at base a little narrower than elytra, moderately tapering, posterior corners of dorsal sclerites angulate, penultimate sclerite with six triangular teeth at apex. Head from beneath rather flat between eyes. Labrum transverse, strongly emarginate anteriorly. Eyes large, more than twice as long as broad and with very large facets. Antennae barely reaching anterior margin of head, basal joint two-thirds as long as eye, somewhat compressed, second joint cylindrical and two times as long as broad, remaining joints, except the terminal, transverse and forming a compressed club, terminal broadly oval and shorter than the two preceding joints together. Maxillary palpi elongate, second joint arcuate, clavate at apical half, third joint as long as second, slender, feebly thickened toward apex, fourth joint thickly subulate, two-thirds as long as the third. Legs short and strongly compressed.

Type locality.—Hamburg Farm, Santa Clara Province, Costa Rica.

Type and paratype.—Cat. no. 29060 U. S. N. M.

There are sparse microscopic hairs, barely visible, at the lateral and posterior margins of the elytra, more at the apices of the dorsal abdominal sclerites, otherwise the dorsal surface is glabrous. On the ventral surface and legs there is rather sparse and fine yellowish pilosity and at the apices of the abdominal segments a few erect, stiff black hairs.

This is an unusually narrow species. Described from two specimens collected by F. Nevermann, one being selected as type.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

BIOLOGICAL SOCIETY

693D MEETING

The 693d meeting was held in the assembly hall of the Cosmos Club April 24, 1926 at 8:10 p.m., with President OBERHOLSER in the chair and 61 persons present. New members elected: JAMES O. MALONEY, S. PRENTISS BALDWIN (life member).

C. W. TOWNSEND described a recent trip with T. GILBERT PEARSON through the southern states in search of birds. They visited Miss ABBIE AUDUBON, 90 years old, the granddaughter of AUDUBON. At King Ranch, Texas, an unsuccessful search was made for the whooping crane. The quail study station in southern Georgia, in charge of Mr. STODDARD, was visited, and a call was made upon ARTHUR WAYNE at Mt. Pleasant, S. C. In Florida, roseate spoonbills, limpkin, and everglade kites were seen.

A. WETMORE gave an account of an egg recently laid at the Zoological Park by a California condor. Three birds of this species have been at the Zoo for many years. The two eggs laid in previous years have been accidently broken by the birds. The egg laid this year was put under a hen, but did not

hatch, and is now in the National Museum. The egg is very similar in appearance to that of a goose. An amateur collector once sent one to the Museum which he had bought for $500, but which proved under microscopic examination to be a goose egg. H. C. OBERHOLSER stated that a collector had once sent Major BENDIRE eggs said to be those of a rare Florida hawk, which presented a peculiar appearance about the blow-hole, and which proved to be painted pullet's eggs.

S. PRENTISS BALDWIN, Cleveland, Ohio: *Intensive study of the life history of birds.*—The speaker described his work in bird banding at Cleveland, Ohio, and at his Georgia station. During 10 years he has banded about 50,000 birds. Special attention has been devoted to the house wren, of which 12 to 15 pairs nest on his grounds near Cleveland. Aided by several young ornithological assistants, close watch is kept on the birds' actions all day long. The eggs are weighed daily, and the order of laying and hatching is noted, as well as the gain in weight of the nestlings and many other matters. The birds quickly become familiar and recognize individuals. In addition to numbered bands for individual birds, sex bands of different colored celluloid are used for convenience in studying the actions of the birds. The sexes are distinguished by song, flight, method of entering nest boxes, etc. The male migrates north first and at once adopts a certain territory for his own. The birds raise two broods each year and generally change mates between broods. Young birds are led off by their parents when very young and almost never come back to the same nest box. No cases of interbreeding have been noted.

S. PRENTISS BALDWIN: *Life history of the house wren* (illustrated).—The speaker showed two reels of moving pictures exhibiting the nesting activities of the house wren, and the method by which these were recorded.—Discussed by L. J. COLE, E. P. WALKER, A. WETMORE, and R. M. LIBBY.

694TH MEETING

47TH ANNUAL MEETING

The 694th regular and 47th Annual Meeting was held in the new lecture hall of the Cosmos Club, May 8, 1926 at 8:10 p.m., with President OBERHOLSER in the chair and 20 persons present. The minutes of the previous Annual Meeting were read and approved.

The annual reports of the Recording Secretary, Corresponding Secretary, Treasurer, and Publications Committee were read and ordered placed on file. B. H. SWALES, for the Auditing Committee, reported that the Treasurer's accounts had been found correct. S. A. ROHWER gave an informal report for the Committee on Communications.

After the suspension of the By-laws, the following new members were elected: Dr. FRANCIS R. HAGNER, Dr. T. GILBERT PEARSON.

S. A. ROHWER moved the suspension of the By-laws and the re-election of the officers elected last December, which was carried unanimously. The officers of the Society for the ensuing year are as follows:

President, H. C. OBERHOLSER; *Vice-Presidents*, E. A. GOLDMAN, A. WETMORE, C. E. CHAMBLISS, H. H. T. JACKSON; *Recording Secretary*, S. F. BLAKE; *Corresponding Secretary*, T. E. SNYDER; *Treasurer*, F. C. LINCOLN; *Members of Council*, H. C. FULLER, W. R. MAXON, C. W. STILES, A. A. DOOLITTLE, B. H. SWALES.

S. F. BLAKE, *Recording Secretary.*